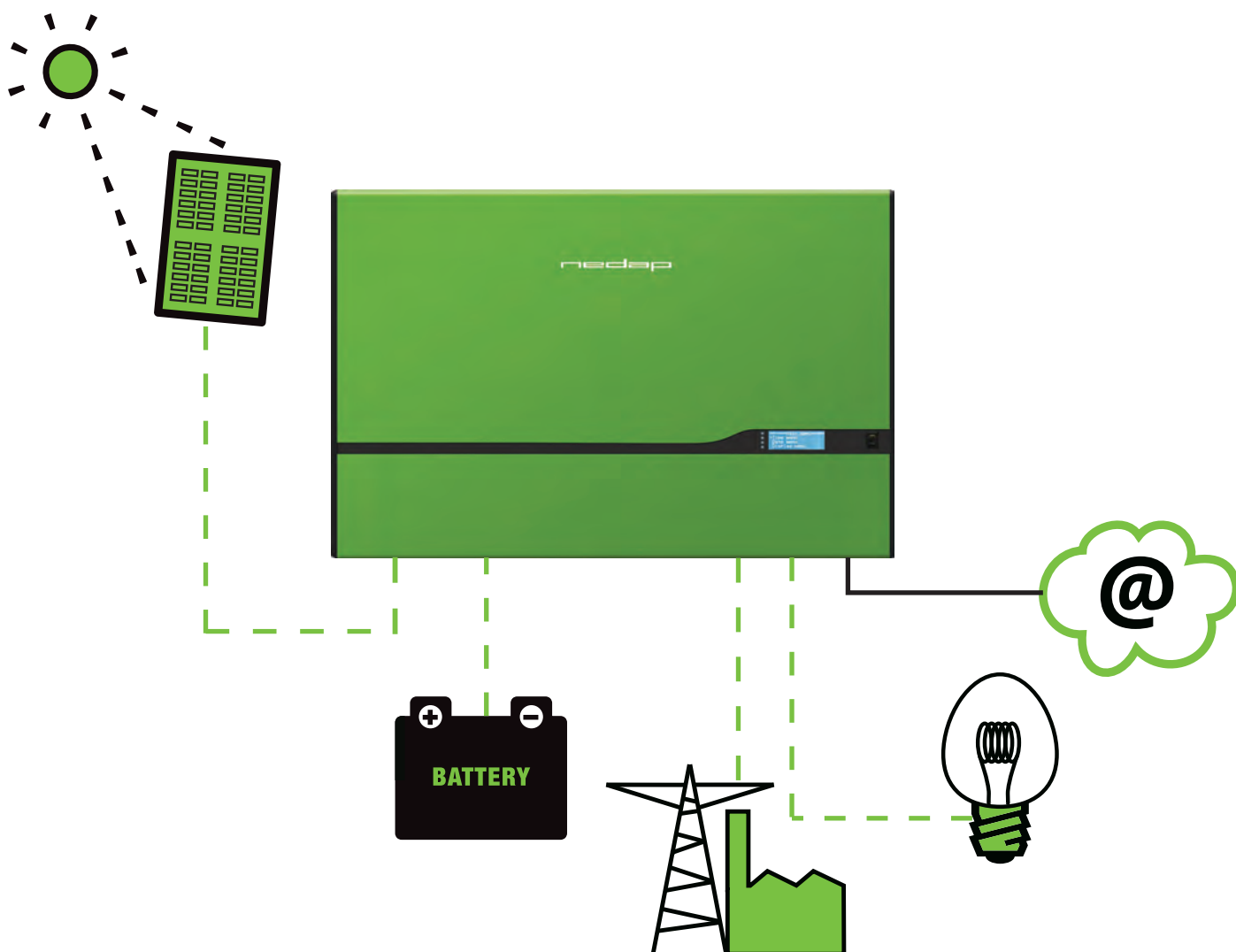


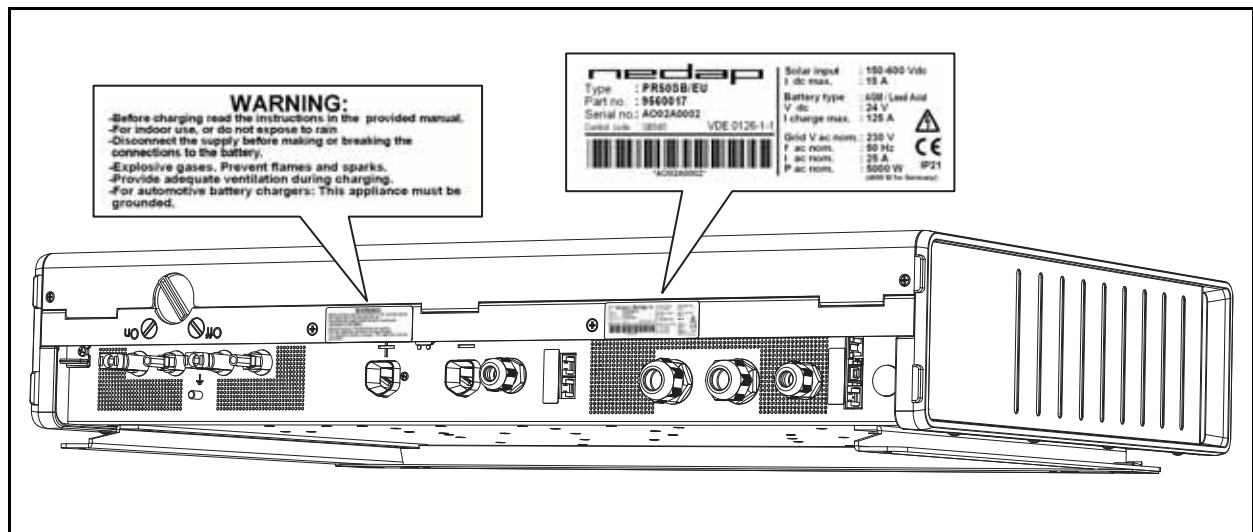
Installation Manual

PowerRouter Solar Battery – self-use

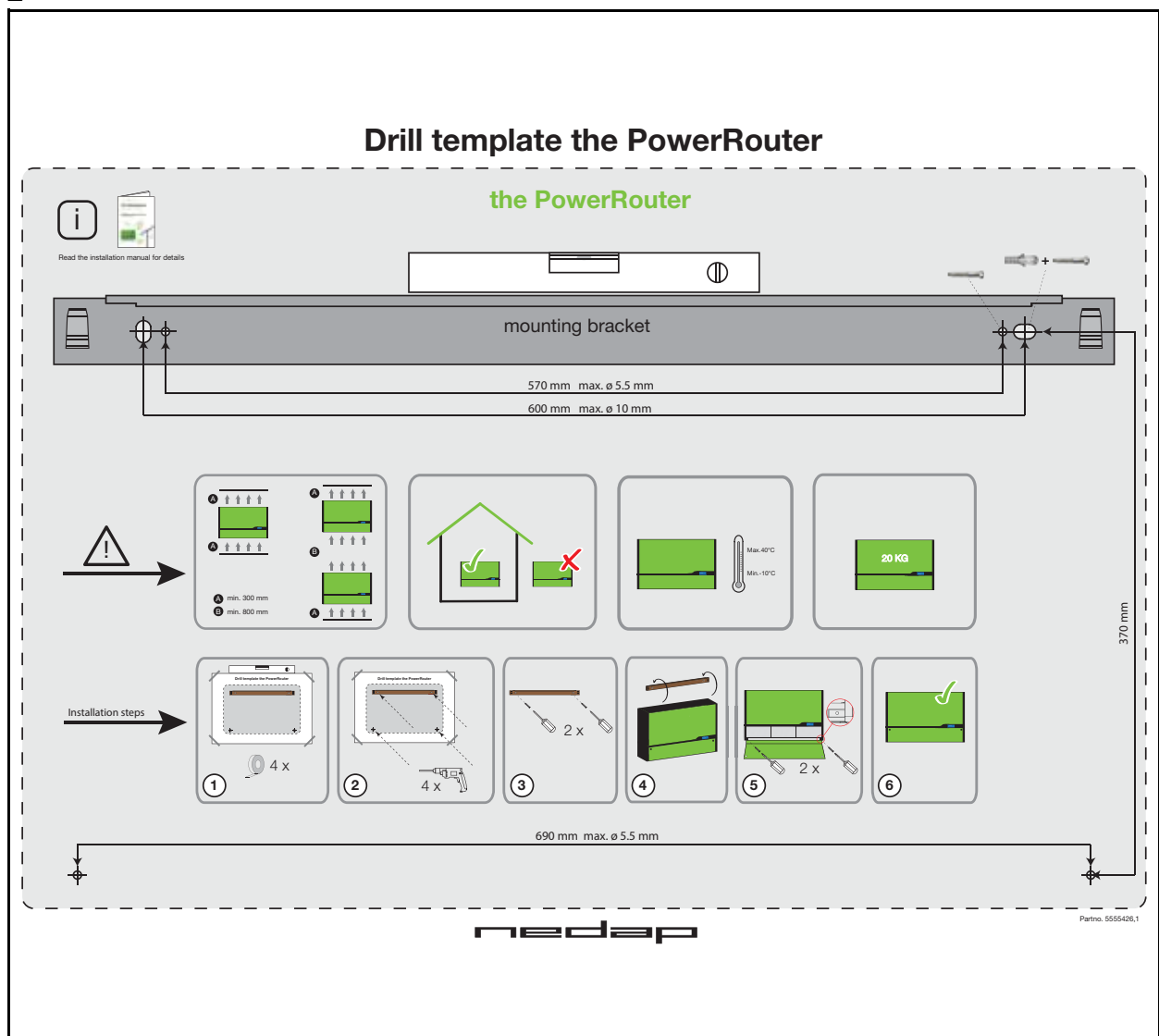


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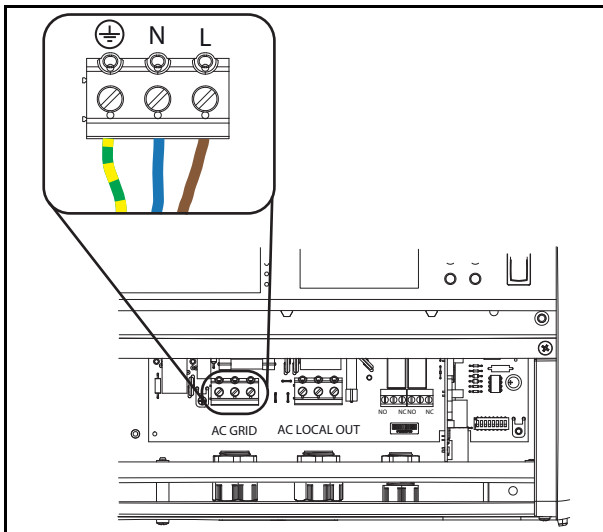
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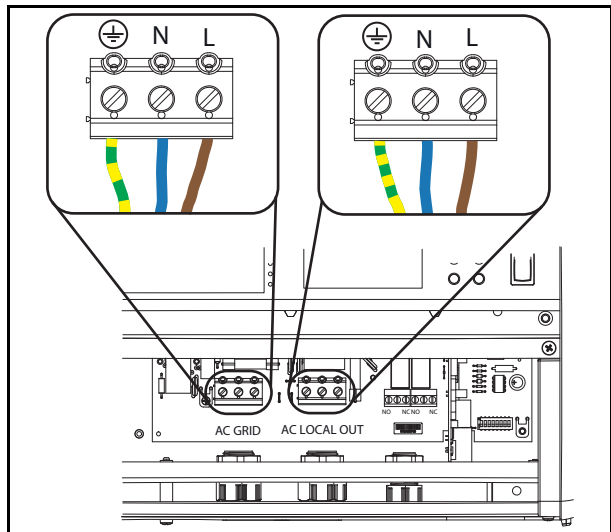
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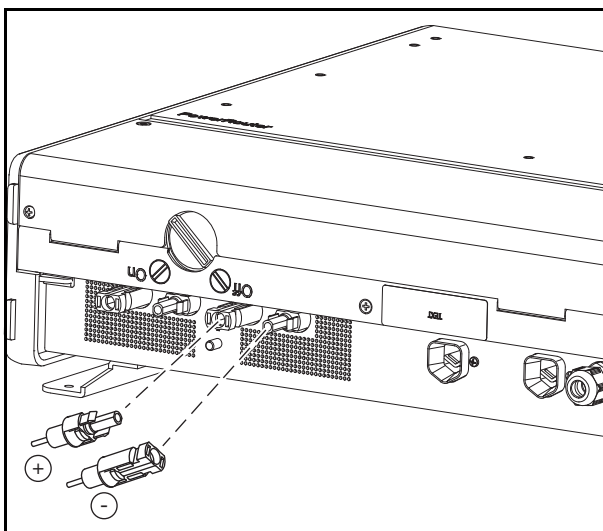
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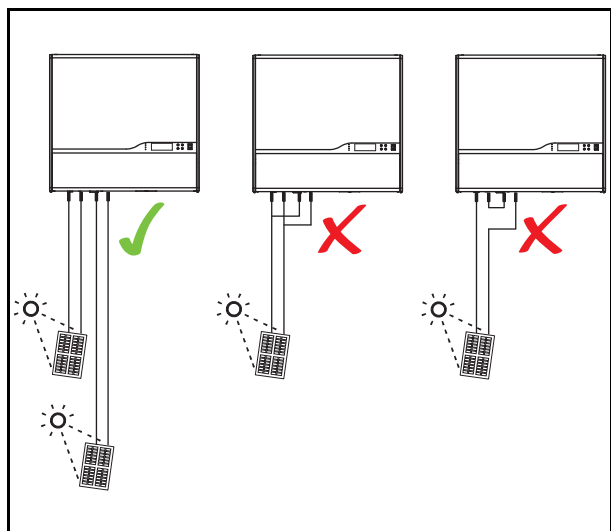
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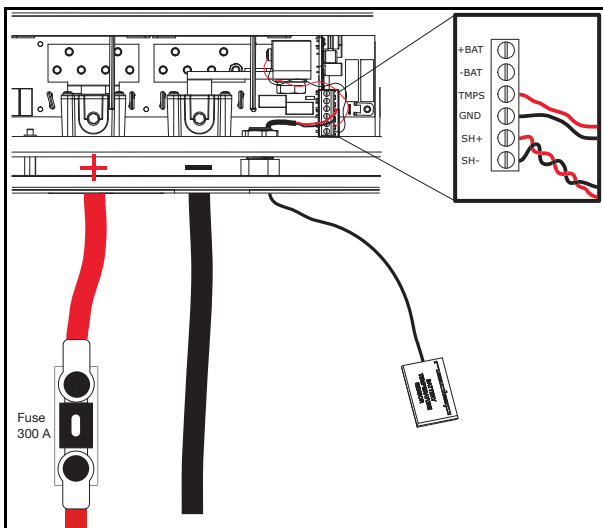
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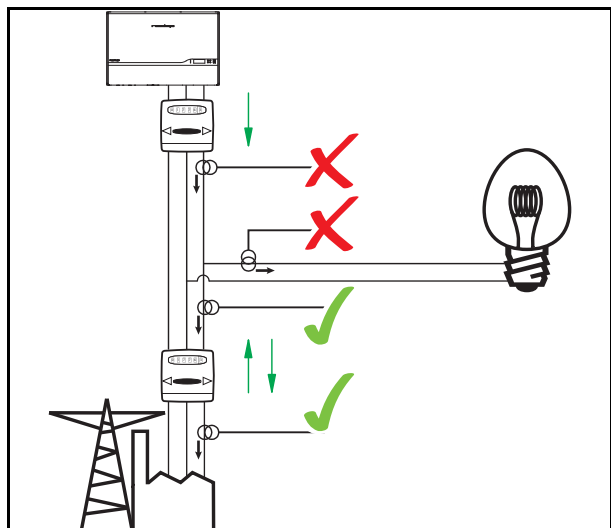
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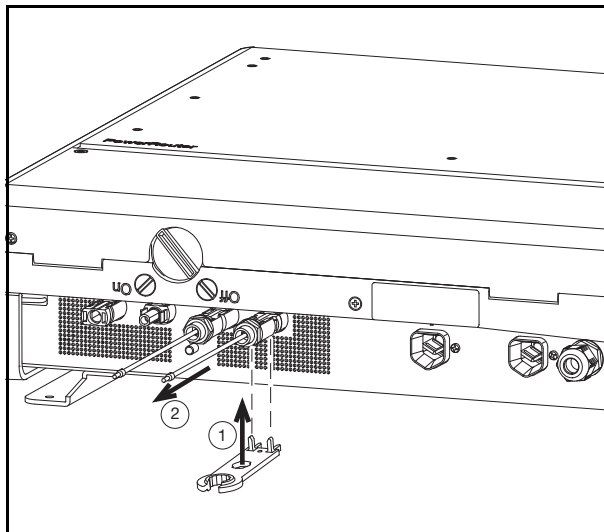
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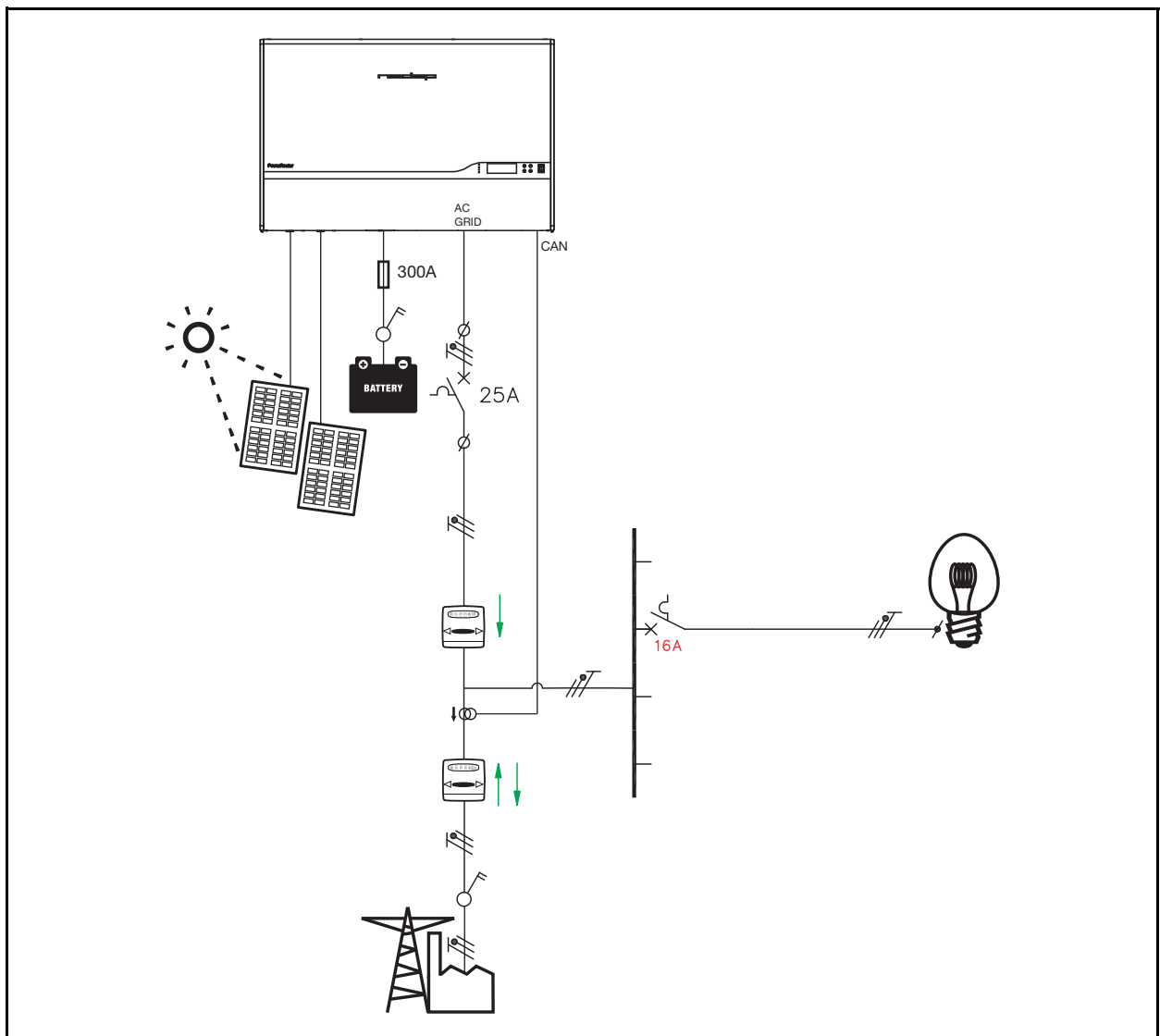
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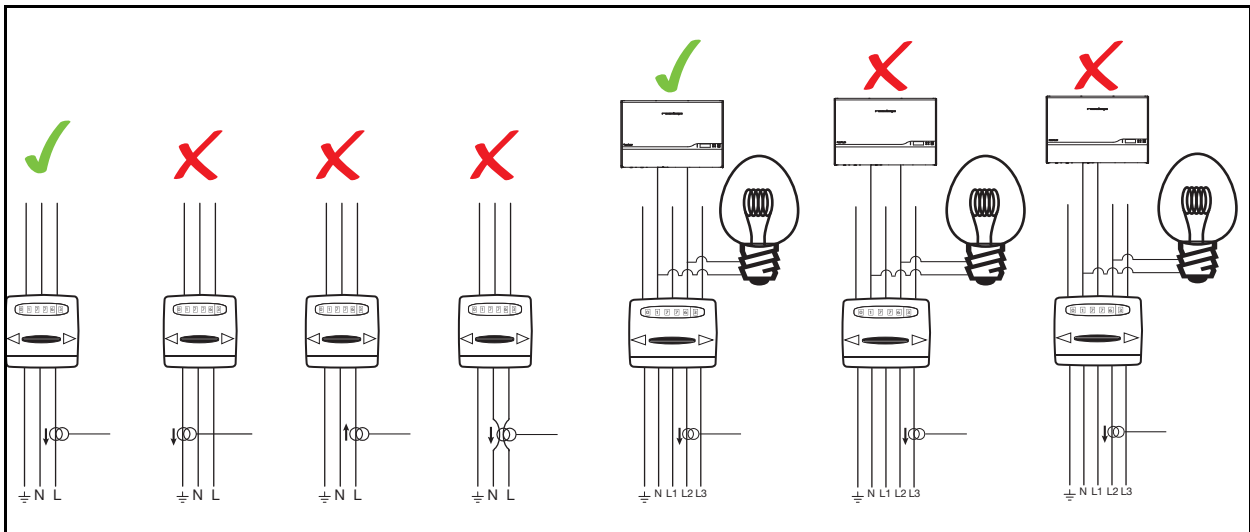
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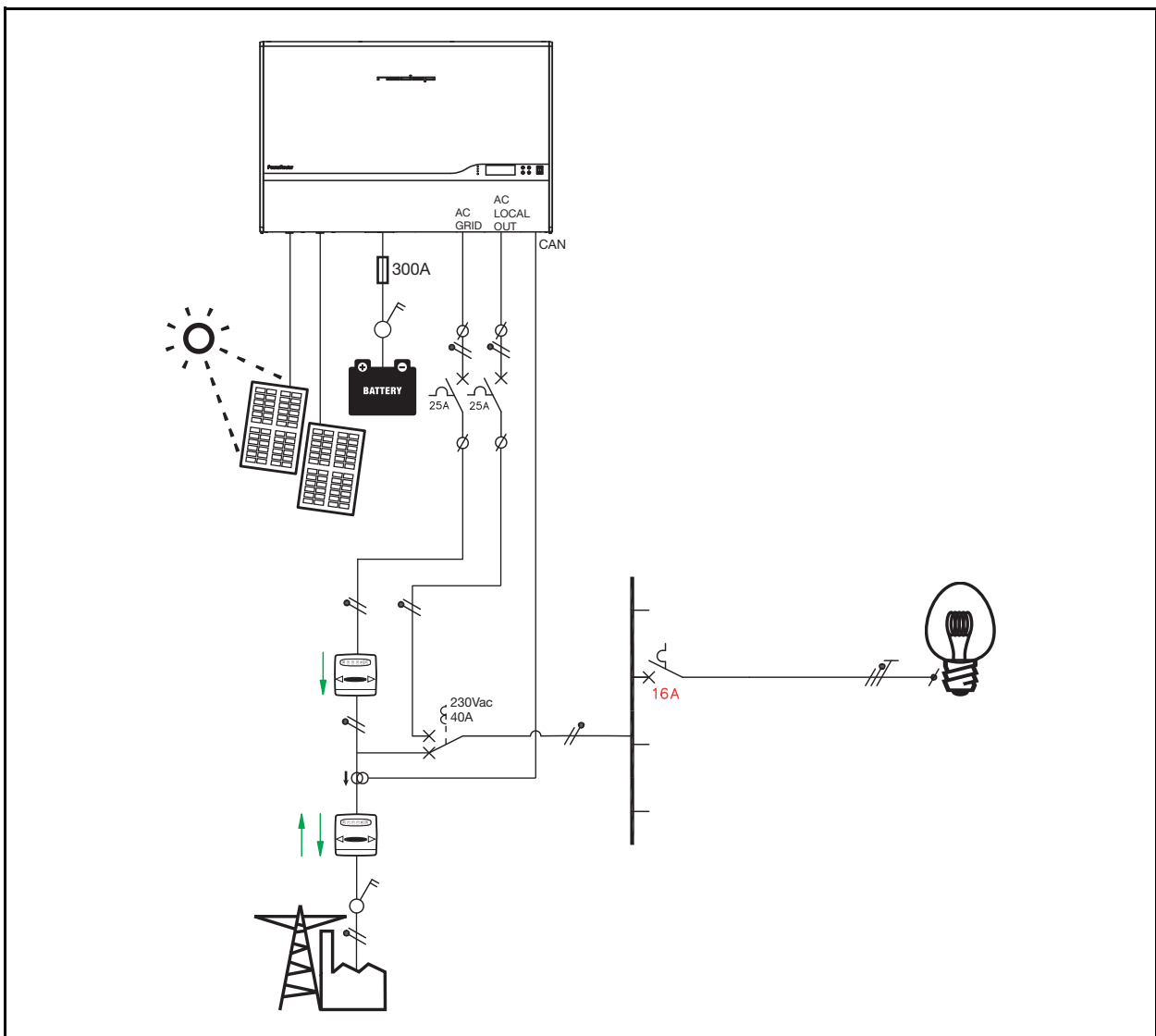
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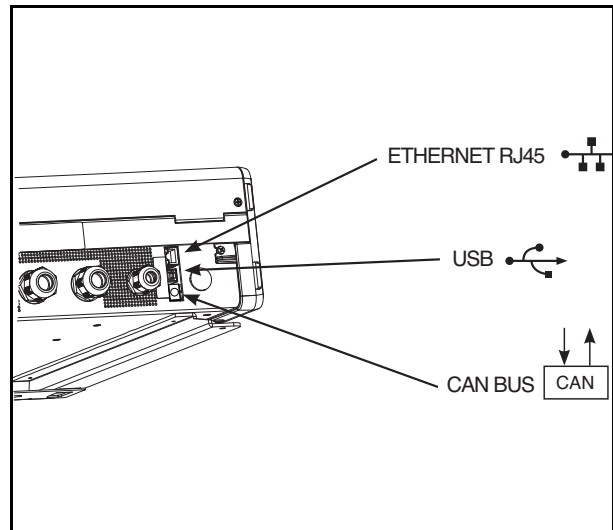
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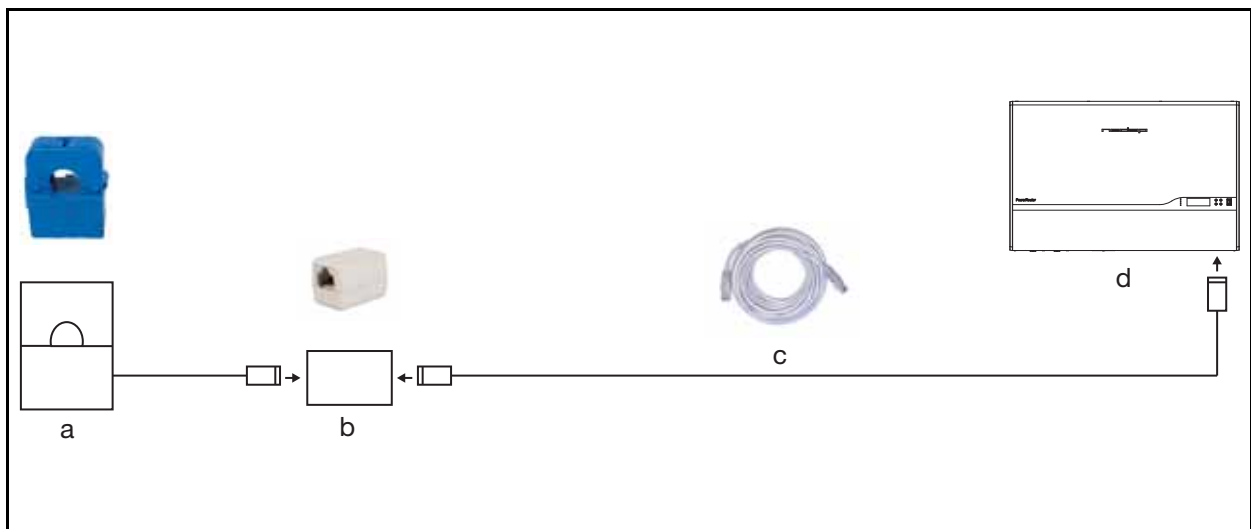
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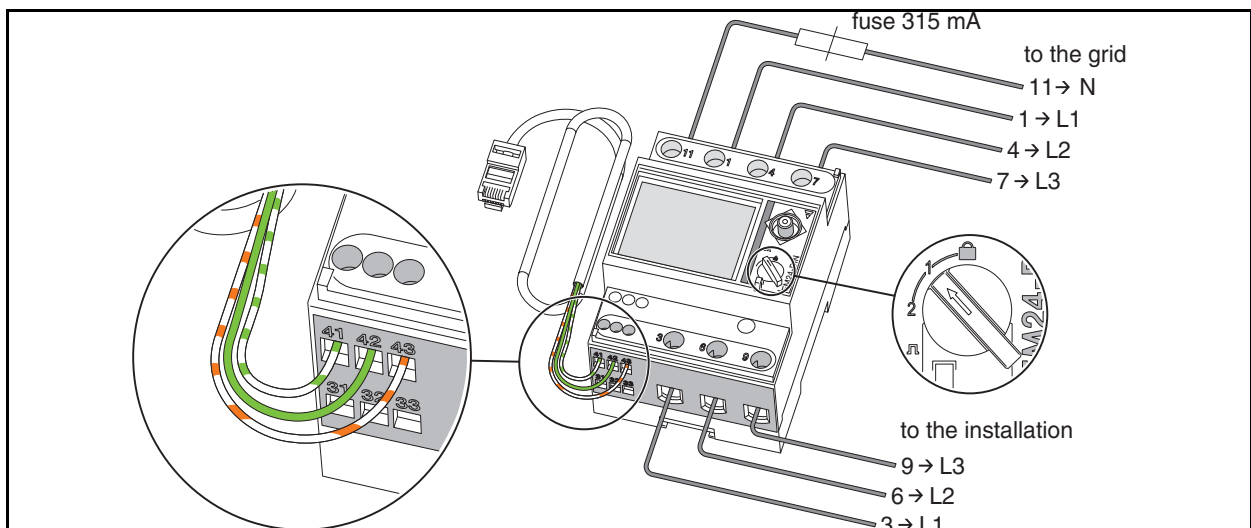
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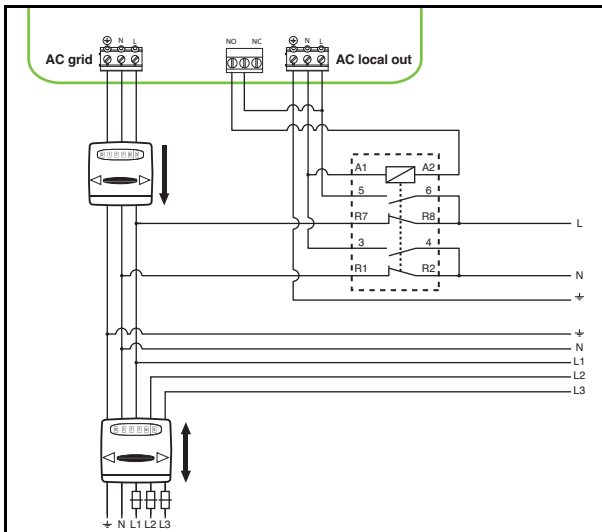
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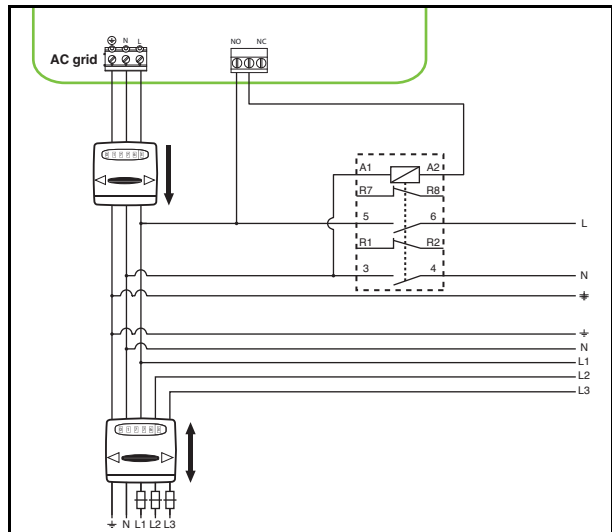
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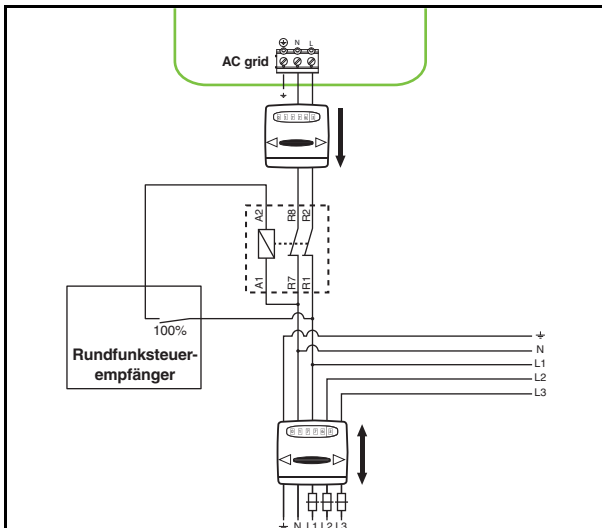
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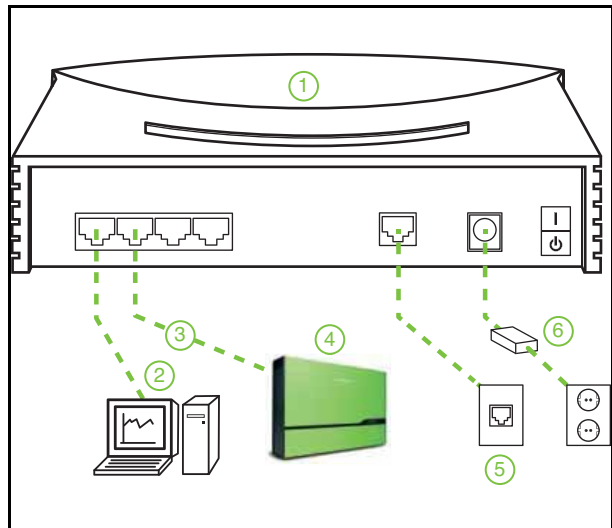
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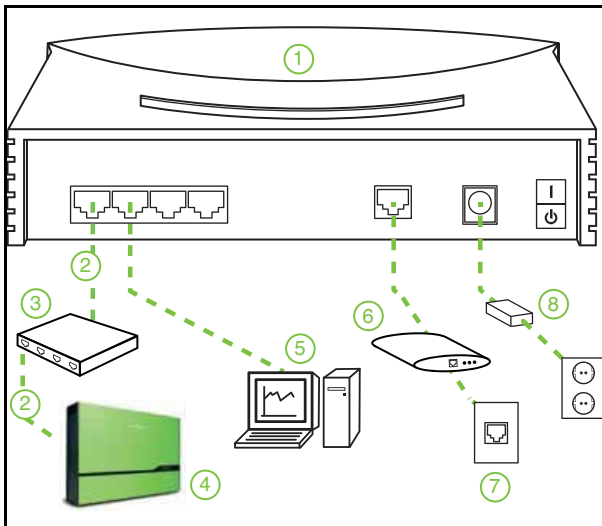
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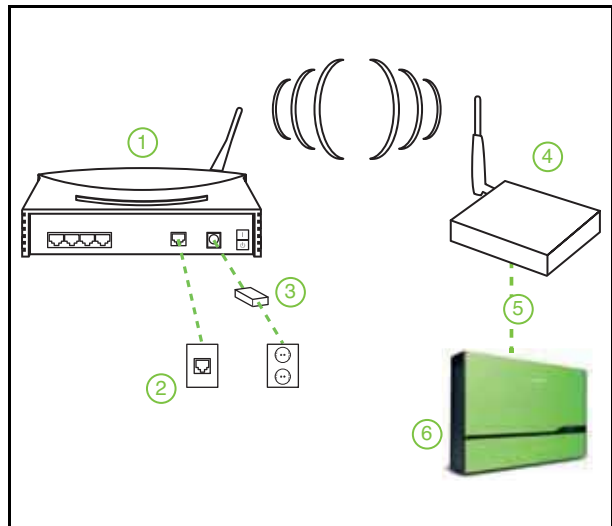
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22



23



24

the PowerRouter
you're in charge

Enter your username and password and click on login

Username

Password

☐ Keep me logged in

[Forgot password?](#)

[New user](#)

Login

25

the PowerRouter
you're in charge

Enter the following data about your PowerRouter and click on register

Part no.

Serial no.

Control code

Register

26

the PowerRouter
you're in charge

Welcome New User! For us to be of good service we ask you to enter the following data.

Step 1 of 3: Account

Language

Choose a password (and repeat it exactly)
We will mail you this password as a reminder

Username*

New password*

Password confirmation*

Please enter your e-mail address for your password confirmation. Further, we may contact you periodically for new PowerRouter features and updates.

Email address*

* Mandatory

Continue

27

the PowerRouter
you're in charge

Welcome New User! For us to be of good service we ask you to enter the following data.

Step 2 of 3: Your name and address

First name

Last name

Street

House number -

Zip code

City

State

Country

Back to Step 1 Finish

28

The screenshot shows the 'My PowerRouters' interface with the 'General' tab selected. The left sidebar lists 'PR50SB-BS Self-use', 'PR50S', and 'PR37S'. The main area displays the following configuration details:

Description	PR50SB-BS Self-use
Serial no.	9561773B101DEMO1
Type label	PR50SB-BS/S240
Version	3.3.3
Installation date	18-01-2012
Battery	225 Ah

At the bottom, there are buttons for 'New PowerRouter', 'Remove PowerRouter', and 'Save my settings'.

29

The screenshot shows the 'My PowerRouters' interface with the 'New PowerRouter' button selected in the sidebar. The main area contains the following registration instructions and fields:

Enter the following data about your PowerRouter and click on register

Part no.

Serial no.

Control code

On the back of the PowerRouter you will find a corresponding sticker like depicted here. Take the serial & part no. and the control code from it and enter this data into their corresponding fields.

The label image shows the following information:

nedap	
Type : PR50S/EU	Solar input : 150-500 Vdc
Part no. : 9560688	I dc max. : 15 A
Serial no. : A722B0002	DC disconnect included
Control code: 7XT44	
Grid V ac nom.: 230 V	CE IP21
f ac nom.: 50 Hz	
I ac nom.: 25 A	
P ac nom.: 5000 W	
(4000 W for Germany)	

At the bottom right, there are buttons for 'Cancel registration' and 'Register PowerRouter'.

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1 Introduction

1.1 Applicability

This installation manual is intended for qualified installation personnel. It describes how you can safely install, connect and start the following PowerRouter types:

- PR50SB-BS
- PR37SB-BS
- PR30SB-BS

1.2 Symbols used in the documentation



DANGER

This symbol indicates a hazardous situation which, if not avoided, could result in death or serious injury.



WARNING

This symbol indicates a situation which, if the instructions are not followed, could result in injury and damage to the equipment.



CAUTION

This symbol indicates a situation which, if the instructions are not followed, could result in damage to the equipment.



This symbol indicates additional information to ensure optimal operation of the system.

1.3 Warranty

PowerRouter factory warranty conditions

Our quality control program ensures that each PowerRouter product is manufactured to exact specifications and is thoroughly tested before leaving the factory.

5 year warranty

The Nedap factory warranty period is 5 years from the purchase date of the PowerRouter system. The warranty conditions are based on EU Directive 99/44/EC, without prejudice to any legal rights.

Extended warranty

For all PowerRouter systems you can acquire a 5-year extension to the PowerRouter factory warranty, for a total of 10 years of warranty coverage. The extended warranty can only be purchased within 6 months of the PowerRouter delivery date.

Warranty conditions

If a PowerRouter becomes defective during its warranty period, one of the following services will be performed at no charge for materials, but exclusive of labour costs, at the discretion of the PowerRouter Helpdesk:

- Repair at Nedap N.V.
- Repair on site
- Exchange for a replacement unit (of equivalent value according to model and age)

Exclusion of liability

Warranty claims and liability for direct or indirect damage are excluded if arising from:

- Transport and storage damage
- Incorrect installation and/or commissioning
- Modifications, changes or attempted repairs by untrained and unauthorised personnel
- Incorrect use or inappropriate operation
- Insufficient ventilation of the device
- Failure to observe the applicable safety regulations
- Force majeure (e.g. lightning, overvoltage, storm, fire)
- Cosmetic shortcomings which do not influence the functioning of the unit
- Damage due to moisture and/or other environmental conditions



The installer/dealer who installed the PowerRouter must report the defective PowerRouter system to the PowerRouter Helpdesk. Nedap reserves the right to replace the unit with one having equal or better specifications, at Nedap's judgement.

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2 Safety

2.1 General safety

Before installing or using the PowerRouter, read all of the instructions, cautions, and warnings on the PowerRouter and solar panels and in this installation manual.

**DANGER**

Solar panels produce electrical power when exposed to light and can cause an electric shock, energy, or fire hazard.

**DANGER**

Batteries deliver electric power (max. 24 V, 200 A) and can cause an energy or fire hazard when they are shorted, or wrongly installed.

**DANGER**

The AC grid delivers electrical power (230 V, 50 Hz).

**WARNING**

As an extra safety measure it is recommended that a 2-pole emergency switch is installed at the AC LOCAL OUT connection (if used). This emergency switch must be connected in accordance with the UPS-safety standard.

**WARNING**

Series fuse protection of solar panels. Series fuse protection may be required, depending on the type and configuration of the solar panels used in the system.

**WARNING**

Series fuse protection is required for the batteries.

**CAUTION**

Contact the local utility company before connecting the PowerRouter to the Public grid.

2.2 Symbols and labels on the equipment

There are two labels on the PowerRouter (figure 1):

- A warning label indicating potential risks.
- A type label that provides technical specifications.

2.3 Intended use

The PowerRouter is a solar inverter, designed for indoor use. It is designed for use with solar panels and battery storage to optimise self-use. The PowerRouter can be used for self-use purposes. In case of a grid failure, the optional AC local out supplies backup power to the connected load.

2.4 Batteries



WARNING

Batteries must be located in a designated battery charging area. A battery charging area must comply with the local regulations. This is because of the dangers of hydrogen gas and battery acid.



WARNING

Explosive gasses. Prevent flames and sparks. Provide adequate ventilation during charging.



As a feature the batteries are equipped with a temperature sensor, the PowerRouter uses the sensor input to control charging of the batteries. If batteries become too hot, the PowerRouter will stop charging the batteries.

3 General description

3.1 The PowerRouter

The PowerRouter is a solar inverter for use with solar panels and battery storage. The PowerRouter's optional AC LOCAL OUT connection supplies backup power to the connected load in the event of a grid failure. The ability to do so depends on the amount of power the system is producing. For more information visit www.PowerRouter.com.

The PowerRouter is compliant with the following standards:

- 2004/108/EC (EMI)
- 2006/95/EC (low voltage directive)

3.1.1 Internet connection

When the PowerRouter is connected to the internet the myPowerRouter.com web portal provides detailed system information (for example performance, profit) for your PowerRouter. The PowerRouter can even be remotely updated with new firmware containing the latest features, so the system is always kept up to date.

3.2 1-phase sensor

The 1-phase sensor is supplied with the PowerRouter Solar Battery. With the signal from the 1-phase sensor, the PowerRouter determines the energy exchange with the public grid on one phase.

3.3 3-phase sensor (optional)

With the signal from the 3-phase sensor, the PowerRouter determines the energy exchange with the public grid for a 3-phase system. The 3-phase sensor can be ordered at Nedap, or via your local business partner.

3.4 External relay (optional)

You can use the external relay to:

- Setup a backup power supply (figure 18).

If the public grid fails, the external relay is energised. The switch over to the local AC grid is done via one of the user-selectable relays (K201 / K202) of the PowerRouter (section 5.3).

- Load management (figure 19).

If the amount of solar energy fed to the public grid exceeds the programmed value, the PowerRouter can switch on additional loads via the external relay. How long the load stays switched on can be programmed in the PowerRouter, via advanced settings in the PC software installation tool (section 5.3).

- Isolate the PowerRouter from the public grid (figure 20).

The disconnection are according to the German directive EEG2012. Only the disconnect contacts of the relay are used (section 4.9).

The external relay can be ordered at Nedap, or via your local business partner.

3.5 Batteries

The PowerRouter functions with any lead-acid batteries, for examples see section 9.2. Proper settings can be made via advanced settings in the PC software installation tool (section 5.4).

3.6 Battery temperature sensor

The battery temperature sensor is installed on the batteries. The PowerRouter uses the sensor input to optimise charging of the batteries. When the batteries overheat, the PowerRouter stops charging the batteries. Proper settings can be made via advanced settings in the PC software installation tool (section 5.4).

4 Installation

4.1 Check the contents of the PowerRouter box

The PowerRouter box must contain the following:

- The PowerRouter.
- Wall-mounting bracket.
- 1-phase sensor, sensor cable and UTP coupler.
- Set of manuals, including the drill template.
- Temperatures sensor.

4.2 Determine the mounting location

The installation location of the PowerRouter must meet the following:

- The PowerRouter must be mounted indoors (IP20).
- Mount the PowerRouter as close as possible to the meter cupboard.
- Use wires with a conductor size of 4 mm².
- Do not mount the PowerRouter in direct sunlight.
- Do not mount the PowerRouter on flammable construction materials.
- Do not mount the PowerRouter in areas where highly flammable materials are stored.
- Do not mount the PowerRouter in areas where there is a danger of explosion.
- Do not mount the PowerRouter during periods of precipitation or high humidity (>95%). Moisture trapped within the location may cause corrosion and damage to the electronic components.
- The ambient air temperature must not exceed 40 °C; this is necessary to maintain a safe temperature of the internal components. The PowerRouter reduces the power output if the ambient air temperature exceeds 40 °C.
- The location is not accessible for children.
- The PowerRouter emits a slight hum during operation. This noise is normal and has no effect on performance, but it can be disturbing if the unit is installed on a wall in a living area, on the outside of a wall that is near a living area, or on certain types of materials (thin wood panels or sheet metal).
- The wall should be within ± 5° vertical.
- The mounting surface must be able to support the weight of the PowerRouter (20.5 kg).
- The type information sticker must be visible after mounting the PowerRouter. The sticker contains the serial number which is the login code for the install wizard, the software installation tool and to register at www.myPowerRouter.com for logging and monitoring (figure 1).

- The outside dimensions of the PowerRouter are 765 x 502 x 149 mm (W x H x D).
- The PowerRouter must be installed with 300 mm clearance at the top and bottom of the unit.
- If multiple PowerRouters are stacked there must be 800 mm of clearance between each PowerRouter.

**DANGER**

Do not mount the PowerRouter on or underneath flammable construction materials.

**DANGER**

Do not mount the PowerRouter in areas where highly flammable materials are stored.

**DANGER**

Do not mount the PowerRouter in areas where there is a danger of explosion.

**WARNING**

To prevent electric shock or other injury, check for existing electrical or plumbing installations in the walls before drilling the holes for the PowerRouter.

**CAUTION**

Ensure that there is sufficient clearance for the airflow around the PowerRouter! Local regulations may require larger working clearances.

**CAUTION**

If you mount the PowerRouter in a cabinet, closet or other relatively small enclosed area, sufficient air circulation must be provided in order to dissipate the heat generated by the unit.

4.3 Mount the PowerRouter

The PowerRouter is shipped with a wall-mounting bracket that is suitable for use on most walls.

To mount the PowerRouter:

1. Use the drill template provided with the PowerRouter to drill the holes for the wall-mounting bracket. (Follow the illustrated instructions on the drill template, figure 2.)
2. Mount the wall-mounting bracket.
3. Mount the PowerRouter.
4. Open the front cover.
5. Mount the additional screws (use a screwdriver with a blade-length of at least 160 mm).

4.4 Connect the AC grid

See figure 11 for the schematic overview of an AC Grid.

1. Install an AC Disconnect Switch between the PowerRouter and the AC grid (figure 11).
2. Strip the insulation off the wires.
3. Pass the wires through the strain-reliefs at the bottom of the PowerRouter.
4. Connect the earth (\perp), phase (L) and neutral (N) wire from the AC grid to the AC disconnect switch, and from the AC disconnect switch to the GRID terminal on the PowerRouter (figure 3).
5. Tighten the strain-reliefs with a torque between 1.2 Nm and 1.5 Nm.



WARNING

Before you connect the PowerRouter to the Public AC grid, contact the local utility company. They have to confirm that it is allowed to connect the system.



CAUTION

To prevent overheating of the wires, you must use wires with a conductor size of 4 mm².

4.5 Connect the solar panels

1. Make sure the DC Disconnect Switch (figure 5) on the PowerRouter is OFF.
2. Verify that the DC voltage and current of your solar installation do not exceed the maximum values specified on the type plate of the PowerRouter (600 VDC, 15 A).
3. Check the polarity of the solar panel string by performing a voltage measurement.
4. Use a suitable tool to attach the MC4 plug to the solar panel string wires.
5. Connect one string to the left solar panel string input terminals (Use mating MC4 connectors, figure 5 / figure 6).
6. If you have a second string connect it to the other solar panel string input terminals.



DANGER

The wires from the solar panels are always energised. The maximum string voltage for solar panels is 600 V. The current may not exceed 15 A.



DANGER

Use copper wire (4 mm²) for all wiring from the solar panel string to the PowerRouter. Only use solid or stranded wire. Do not use fine stranded wire.



CAUTION

Do not connect a single solar panel string to both solar panel string terminals simultaneously (parallel connection) (figure 6).

**CAUTION**

Do not connect a single solar panel string to both solar panel string terminals in series (figure 6).



The PowerRouter PR30SB models only have one solar panel string input.



To prevent static charge we advice to ground the supporting frame of your solar panels. Read the instructions of the manufacturer.

4.6 Connect the batteries

1. Install a Battery Disconnect Switch (2-pole isolation) between the PowerRouter and the batteries (figure 11).
2. Install a fuse (300 A slow-blow) in series with the positive battery cable. It must be installed on a fixed surface, as close as possible to the battery (figure 7).
3. Strip approximately 25 mm of insulation from the cable.
4. Insert the cable into the terminal of the PowerRouter (red to the positive terminal, black to the negative terminal).
5. Tighten the cable connection with a torque between 15 Nm and 20 Nm.
6. Use cable lug (eyelet terminal) on the other end of the battery cable.

**DANGER**

Use battery cables with a cross sectional area of 70 mm² to 95 mm² and a maximum length of 2.5 m per cable.

**WARNING**

Batteries must be located in designated battery charging areas, and must comply with the local requirements. This is because of the dangers of hydrogen gas and battery acid.

**WARNING**

Do not smoke or bring open flames near hydrogen gas.

**CAUTION**

Miswiring can cause damage to the PowerRouter. Read the label on the battery.

4.7 Connect the temperature sensor

1. Stick the self-adhesive temperature sensor onto the battery near the (+) pole.
2. Connect the sensor wires to the TMPS (red wire) and GND (black wire) terminals of the PowerRouter (figure 7).

4.8 Connect a self-use sensor

4.8.1 Connect the 1-phase sensor (standard)

1. Remove the protective cap from the PowerRouter's CANBUS connector (figure 15).
2. Place the 1-phase sensor (figure 14) around the phase wire (L) to which the PowerRouter is connected (figure 8 and figure 12).
3. Connect the 1-phase sensor cable to the UTP coupler (figure 16), or directly to the PowerRouter.
4. If necessary connect a CAT5e UTP cable between the PowerRouter CAN port and the UTP coupler (figure 16).



CAUTION

Make sure the 1-phase sensor is installed in the right direction: the arrow on the sensor must point away from the PowerRouter (towards the public grid).



CAUTION

The length of the CAT5e UTP cable must not exceed 25 meters.

4.8.2 Connect the 3-phase sensor (optional)

The optional 3-phase sensor can be ordered at Nedap, or via your local business partner. The order code is PRA3SENSE.

The sensor is configured by the PowerRouter and requires no setup; only hard wiring is required.

1. Connect the 3-phase sensor in accordance with the "3P.n" configuration shown in figure 17.
2. Connect the 1 meter sensor cable to the 3-phase sensor (figure 17).
 - a. Green/white wire -> sensor terminal 41.
 - b. Green wire -> sensor terminal 42.
 - c. Orange/white wire -> sensor terminal 43.
3. Insert the RJ45 plug at the end of the sensor cable into the PowerRouter CAN port. A CAT5e network cable up to 25m in length may be used to extend the connection (RJ45-connector type: T-568B).
4. After initialising (section 4.11), check the PowerRouter display for correct operation of the sensor – "Service menu – Status – Sensor". If correct, "OK" will appear on the display (approx. 1.5 minutes after start-up).



WARNING

Make sure the PowerRouter is disconnected from the Public AC grid during installation.

**CAUTION**

The length of the CAT5e UTP cable must not exceed 25 metres.

**CAUTION**

The 3-phase sensor must not be in the lock position (figure 17).

**CAUTION**

Make sure the sensor is correctly installed. Wrong installation will result in no self-use, or will deplete the battery, and will not recharge the battery.

4.9 Connect the external relay (optional)

The optional external relay can be ordered at Nedap, or via your local business partner. The order code is PRA1RLY.

4.9.1 Connect the external relay for load management

1. Connect the external relay (figure 19). Use one of the user-selectable relays K201 / K202.
2. Program the contact K201 / K202 via advanced settings in the PC software installation tool (section 5.3).

**CAUTION**

The load that is connected to the relay must be 1-phase.

4.9.2 Connect the external relay to isolate the PowerRouter from the public grid

This connection is for EEG2012, which separates the PowerRouter 100% from the public grid. This option is only applicable for Germany

1. Connect the external relay (figure 20).
2. Program the advanced settings in the PC software installation tool (section 5.4.2).

**CAUTION**

The load that is connected to the relay must be 1-phase.

4.9.3 Connect the external relay for a backup power supply

1. Install an AC Disconnect Switch between the PowerRouter and the AC local out (figure 13).
2. Connect the AC local out (figure 4).
3. Strip the insulation off the wires.
4. Pass the wires through the strain-reliefs at the bottom of the PowerRouter.
5. Connect the earth (\perp), phase (L) and neutral (N) wire from the AC loads to the AC LOCAL OUT terminal on the PowerRouter (figure 4).

6. Tighten the strain-reliefs with a torque between 1.2 Nm and 1.5 Nm.
7. Connect the external relay (figure 18). Use one of the user-selectable relays K201 / K202.
8. Program the user-selectable relays K201 / K202 via advanced settings in the PC software installation tool (section 5.4).

**DANGER**

There is a risk of electrical shock if a 3-phase load is connected to the relay. The load that is connected to the relay must be 1-phase.

**CAUTION**

To prevent overheating of the wires, you must use wires with a conductor size of 4 mm².

4.10 Switch on the system

1. Set the external battery disconnect switch to on.
2. Set the solar switch, on the PowerRouter, to on.
3. Set the external AC disconnect switch to on.
4. Switch on the PowerRouter (switch on the display).

4.11 Initialise the PowerRouter

The PowerRouter must be initialised by setting system parameters. After setting the parameters, the PowerRouter is ready to use. There are two methods to set the system parameters.

4.11.1 Installation wizard (on the display)

1. The installation wizard starts automatically the first time you switch on the PowerRouter.
2. Set the PowerRouter system parameters using the installation wizard.

4.11.2 PC software installation tool (for advanced settings)

1. Connect a PC, with the software installation tool, to the PowerRouter's USB port (use a USB cable as shown in figure 10).
2. Use the software installation tool to set the system parameters.



You can download the PowerRouter software installation tool and driver via the PowerRouter website. You need your login details for this website. You can request login details via www.PowerRouter.com. Check the website regularly for updates to the PowerRouter software installation tool.

4.12 Connect the PowerRouter to the internet

4.12.1 Connect to an internet router

An example of a connection is shown in figure 21. The PowerRouter can be connected to any of the available ports. The numbers in the drawing are:

1. Internet Router.
2. Connected computers.
3. CAT5e UTP cable.
4. PowerRouter.
5. ADSL, ISDN, or cable connection.
6. Power adapter for the internet router.

4.12.2 Connect via a Switch to an Internet Router

An example of a connection is shown in figure 22. The PowerRouter can be connected to any of the available ports of the switch. The numbers in the drawing are:

1. Internet Router.
2. CAT5e UTP cable.
3. Ethernet switch.
4. PowerRouter.
5. Connected computers.
6. Internet modem.
7. ADSL, ISDN, or cable connection.
8. Power adapter for the internet router.

4.12.3 Connect to a wireless access point

An example of a connection is shown in figure 23. The numbers in the drawing are:

1. Internet Router.
2. ADSL, ISDN, or cable connection.
3. Power adapter for the internet router.
4. Wireless access point.
5. CAT5e UTP cable.
6. PowerRouter.



CAUTION

The wireless access point must support wireless client function, and it must have a RJ45 connection. If in doubt consult your supplier.

4.12.4 Register the PowerRouter on www.myPowerRouter.com

1. Make sure you have the Part.no., Serial no., and Control code as mentioned on the type label of the PowerRouter (figure 1).
2. Check the internet connection via menu > service > status > internet connection. The display should show OK.
3. Go to a computer and open www.myPowerRouter.com.
4. In the login screen click *New user* (figure 24).
5. Fill out the Part.no., Serial no., and Control code.

6. Click *Register* (figure 25).
7. Fill out the fields in the window (figure 26), and click *Continue*.
8. Fill out the fields in the window (figure 27), and click *Continue*.
9. You will receive a confirmation e-mail.

4.12.5 Register additional PowerRouters on one login

You can register two additional PowerRouters on the same login. To do this:

1. Login on www.myPowerRouter.com.
2. Click *My PowerRouter*.
3. Click *Register a new PowerRouter* (figure 28).
4. Fill out the Part.no., Serial no., and Control code.
5. Click *Register* (figure 29).



CAUTION

The PowerRouter internet connection will not work if a proxy server is being used.



CAUTION

Do not use the AC local out of the PowerRouter to provide power to the internet router, or internet switch.



The PowerRouter only uses internet port 80. This is the default setting on most networks.



The PowerRouter needs a DHCP server within the network. This should be provided by the internet router or the internet switch.



To test the connection, connect a PC to the connection that you will use for the PowerRouter. Open a web page. If the web page opens, the connection works.



The maximum length of the CAT5e UTP cable is 20 meters. If you need to clear a longer distance, you can use an additional router, and an additional cable of 20 meters.



Powerline communication may result in an unreliable internet connection.

5 Advanced settings

5.1 Introduction

After the installation with the PC software installation tool it is possible to make advanced settings to further optimise the PowerRouter for self-use.

Below you find an overview of features that are available in the PC software installation tool, under advanced settings. Each feature has a short description, for detailed information refer to the help available in the PC software installation tool.

5.2 Display settings

5.2.1 Backlight

Sets the time the PowerRouter's backlight stays on after pressing a button.



5.2.2 Display

Select the information that will be shown by default in the status display of the system.



5.2.3 Language

Select the language of the display of the PowerRouter.



5.3 PowerRouter settings

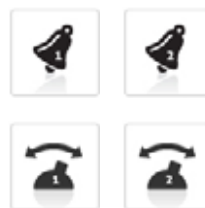
5.3.1 Scenario

Change the scenario of the PowerRouter. Not available on all systems.



5.3.2 Alarm 1 / Alarm 2

The PowerRouter is provided with 2 user-selectable relays referred as K201 and K202. This chapter describes the different alarms you may assign. After specifying the alarm it needs to be assigned to the relay icon, appearing next to the alarm icon in the installation tool. The relay icon can be selected after configuring the alarm.



Off

This is the default selection for an alarm relay. It is off or not used.

Grid voltage alarm

When the grid voltage is outside of the desired range the alarm relay is inactive. This can be used to switch on loads or sound an alarm when the grid voltage is out of range.

For example to protect sensitive loads against high voltage. Or to switch on additional loads when the grid voltage is high. Which is usually an indication of high feed-in power.

Battery State of Charge (SoC)

Alarm based on the battery state of charge. The alarm relay is activated when the battery State of Charge is outside the specified range.

Battery temperature alarm

Alarm based on the temperature of the battery pack. The alarm relay is activated when the temperature of the battery pack is above the specified range.

Battery voltage alarm

Alarm based on the voltage of the battery pack. The alarm relay is activated when the battery voltage below the specified range.

Grid connection alarm

Alarm based on whether the system is connected to the grid. The relays are inactive if the system is in standby and no grid is available to power the relays. This alarm is not used for backup functionality.

Load management

Switch on additional loads when a surplus of solar energy is available to increase the self-use.

Self use with backup

Alarm based on whether the system is connected to the grid. When disconnected from the grid, the PowerRouter will switch to backup mode.

5.3.3 Standby

Select that the PowerRouter can go in standby. The PowerRouter will go in to standby when there is no solar power or battery power available.



5.3.4 Standby timer

Select a time interval, in which the PowerRouter goes to standby.



5.4 Grid

5.4.1 Country

Set the country grid settings for a specific country.



CAUTION

It is not allowed to select another country, than the country the PowerRouter will be installed.

5.4.2 EEG 2012

Set the dedicated parameters to your installation size to comply with the German EEG 2012 regulation.



5.4.3 VDE 4105

Change the grid settings to comply with the VDE 4105 per local utility requirements.



5.4.4 Dynamic Feed-in Limiter

With the Dynamic feed-in limiter the output of the system can be adjusted. You can:

- Limit the output of the system.
- Limit the output to the grid after the point where the load is connected to the grid.



5.4.5 Battery pack

You can change:

- Type of battery pack
- Size of battery pack
- Depth of Discharge for self-use
- Depth of Discharge during grid failures.



CAUTION

Wrong settings may harm the batteries.

5.4.6 Battery charging

You can change:

- The charging procedure to float charging.
- The absorption voltage and float voltage.
- The charge current.



CAUTION

Wrong settings may harm the batteries.

5.4.7 Maintenance charge

Set the interval of when to perform the maintenance charge.



5.4.8 Self-use battery settings

Change specific battery setting to optimise self-use. With the battery power limiter enabled, the battery will not be used to compensate peak loads, but only for the base load.



5.4.9 Wintermode

Wintermode controls the usage of the battery module during the winter period.



6 Operation

EN

6.1 Service menu

Open the service menu

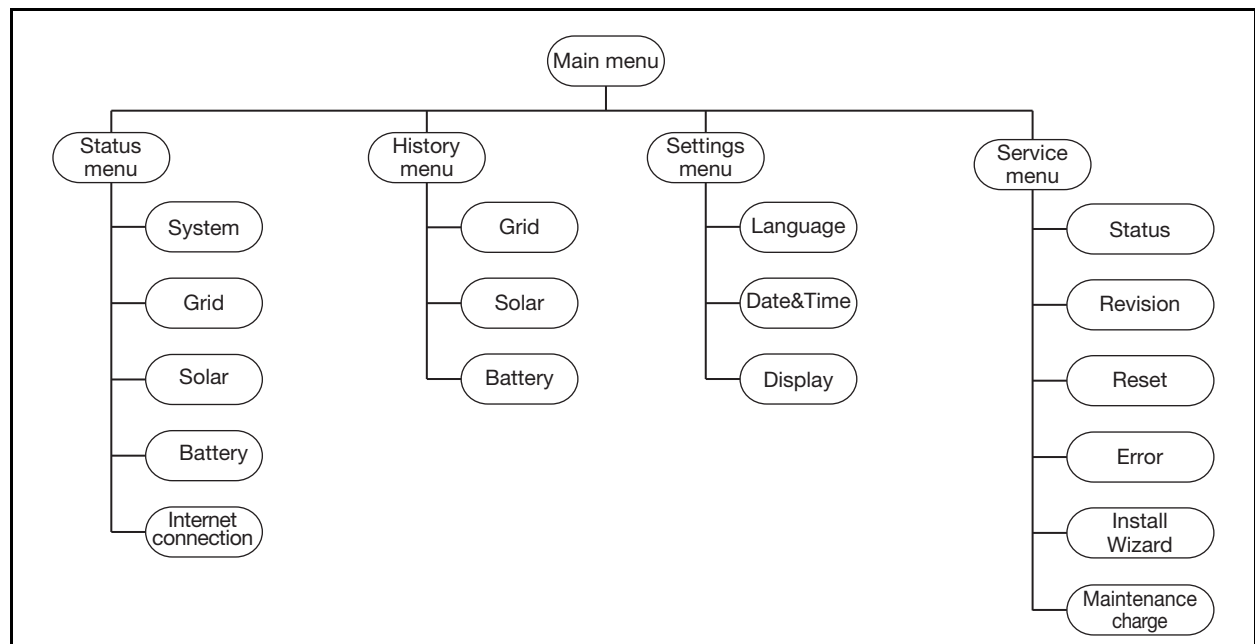
- Press any button on the display to open the service menu.

Navigate through the menu

- Use the UP/DOWN buttons to navigate through the menu.
- Use YES to open the selected item.
- Use NO to return to the previous item.

Select and change settings

- Use YES to change a selected setting.
- Use the UP/DOWN buttons to change the selected setting.
- Use YES to confirm the changed setting.
- Use NO to cancel the change.



7 Troubleshoot

7.1 Troubleshooting

If you encounter difficulty with the operation of your PowerRouter, follow the steps below:

- Check the LED status.
- Check the error message on the LCD display, and the error history.
- If the difficulty remains, contact your installer/dealer.

Collect the following information before you contact your installer or dealer (figure 1):

- Model number
- Serial number
- Brief description of the problem
- LED status
- Displayed error message
- Error history
- Software version and ID number

7.2 Check the LED status

When an error has occurred the LEDs will either be OFF or FLASHING as follows:

Operation	LED colour	LED: ON	LED: OFF	LED: FLASHING
Operational	blue	when unit is operational	when unit is off or there is an error	standby
Charging	blue	trickle charging	discharging	charging
Grid	blue	when grid is connected	when no grid power is available or unit is off	Grid power available, but not connected.
Error	red	when there is an error (**)	no error	when one module/function is not available (*).

* Requires service intervention.

** Error may resolve itself; other modules/functions active.

7.3 Check the error messages

The PowerRouter shows the latest error message on the display. The last ten error messages are stored in the error history. For possible solutions see section 7.6.

Most errors are cleared automatically by the system if the error condition disappears. If an error message does not clear itself, press the NO button for at least 3 seconds to clear the error.

7.4 Error explanation

7.4.1 Hard error

When a hard error occurs the PowerRouter goes into a safe mode and will not function until the user has turned the system off and on or a reset is performed. A hard error is indicated when the error LED is flashing.

7.4.2 Soft error

When a soft error occurs the module in which the error originated will go into a safe mode. Other modules in the PowerRouter will continue to operate. The PowerRouter can recover from the error automatically. A soft error is indicated when the error LED is on.

7.4.3 Error code

Example:

P027-H

P The first letter indicates where the error originated within the PowerRouter

P - Platform

S - Solar module

B - Battery module

G - Grid module

027 The number indicates which error has occurred

H The second letter indicates the level of the error that occurred

H - Hard error

S - Soft error

7.5 Procedures

7.5.1 Restart the PowerRouter

The PowerRouter can be restarted in any of the following ways:

- Turn the system off and on with the on/off switch on the display
- Use the restart function in the service menu
- Use the restart function on myPowerRouter.com

7.5.2 Check the PowerRouter airflow

If an over-temperature condition occurs check the following:

- Make sure the ambient temperature in the room where the PowerRouter is located does not exceed 40 degrees Celsius.
- Make sure the airflow through the PowerRouter is not obstructed. Check the air output at the top and the air input at the bottom.
- Open the connection area of the PowerRouter and make sure the internal fans are turning (this step must be performed by a trained service engineer).

7.6 Errors

Error	Level	Explanation	Action
P027-H P028-H P029-H G025-H	Hard	A grid error has occurred	<ul style="list-style-type: none"> Restart the system (section 7.5.1) The system should recover from the error after the restart Contact your dealer if this error occurs frequently
P058-H	Hard	After a firmware update one of the modules has an incompatible firmware version	<ul style="list-style-type: none"> Contact your dealer for the correct firmware package Update the firmware of the system with the correct version Restart the system (section 7.5.1)
P081-H	Hard	The installation wizard or install tool failed to write the anti-islanding settings to the PowerRouter	<ul style="list-style-type: none"> Restart the system (section 7.5.1) Run the installation tool or install wizard again Contact your dealer if this error occurs frequently
P092-H G034-H B026-H S019-H	Hard	The PowerRouter configuration is incorrect	<ul style="list-style-type: none"> Contact your dealer if this error occurs
P098-H G036-H B028-H S021-H	Hard	The firmware in the PowerRouter does not match the hardware	<ul style="list-style-type: none"> Contact your dealer if this error occurs
P100-S	Soft	There was too much load variation during the sensor test	<ul style="list-style-type: none"> Turn off the loads connected to the same phase as the PowerRouter Restart the system (section 7.5.1)
P105-S	Soft	The PowerRouter needs a 1-phase or 3-phase sensor to operate in the selected scenario. This sensor was not detected.	<ul style="list-style-type: none"> Make sure the connection of the 1-phase or 3-phase sensor is correct and in the right position. For detailed information see the related section in this manual. Restart the system (section 7.5.1)
P106-S	Soft	There is a problem reading the data from the 3-phase sensor	<ul style="list-style-type: none"> Make sure the 3-phase sensor is connected properly Restart the system (section 7.5.1)
P111-S	Soft	The PowerRouter was not able to configure the 3-phase sensor	<ul style="list-style-type: none"> Make sure the 3-phase sensor is connected properly Make sure the 3-phase sensor is not in the locked position Restart the system (section 7.5.1)
P115-H	Hard	The PowerRouter cannot function correctly because some hardware modules were not detected	<ul style="list-style-type: none"> Contact your dealer if this error occurs

G001-S G037-S	Soft	The internal temperature of the grid module (G) is too high The output power of the module is reduced	<ul style="list-style-type: none"> Check the PowerRouter airflow (section 7.5.2) Once the module cools down the error will disappear and normal operation will resume Contact your dealer if this error occurs frequently
G002-S	Soft	An overvoltage occurred on the power backbone. The grid module (G) will be temporarily turned off	<ul style="list-style-type: none"> Once the voltage drops below the safe level the error will disappear and normal operation will resume Contact your dealer if this error occurs frequently
G003-S	Soft	An undervoltage occurred on the power backbone. The grid module (G) will be temporarily turned off (e.g. the load on the local out is higher than the power available in the PowerRouter)	<ul style="list-style-type: none"> Make sure the loads on the local out are turned off After one minute the error will disappear and normal operation will resume Contact your dealer if this error occurs frequently
G007-S	Soft	The voltage level on the local out is too high in a situation where no voltage is expected	<ul style="list-style-type: none"> If this error occurs during installation make sure the grid is connected to the "AC GRID" connection When this error occurs during normal operation an error has occurred in connection with the anti-islanding safety requirements Restart the system (section 7.5.1) Contact your dealer if this error occurs frequently
G011-S	Soft	An undervoltage occurred on the local out. The local out will be temporarily turned off.	<ul style="list-style-type: none"> Make sure the loads on the local out are turned off After one minute the error will disappear and normal operation will resume Contact your dealer if this error occurs frequently
G012-S	Soft	An overvoltage occurred on the local out. The local out will be temporarily turned off (e.g. a very high load connected to the local out was suddenly disconnected)	<ul style="list-style-type: none"> Make sure the loads on the local out are turned off After one minute the error will disappear and normal operation will resume Contact your dealer if this error occurs frequently
G013-H	Hard	A short circuit was detected on the PowerRouter local out	<ul style="list-style-type: none"> Make sure the loads on the local out are turned off Check the wiring connected to the local out for a short Restart the system (section 7.5.1)
G015-S	Soft	There was an internal communication error within the PowerRouter	<ul style="list-style-type: none"> After one minute the error will disappear and normal operation will resume Contact your dealer if this error occurs frequently
G023-H	Hard	The local out output was overloaded	<ul style="list-style-type: none"> Turn off the loads connected to the PowerRouter Restart the system (section 7.5.1)
G025-H	Hard	See P027-H	
G028-H	Hard	An error occurred on one of the internal voltage supplies of the grid module (G)	<ul style="list-style-type: none"> Restart the system (section 7.5.1) The system should recover from the error after the restart Contact your dealer if this error occurs frequently
G029-S	Soft	The grid module (G) start-up procedure failed	<ul style="list-style-type: none"> After one minute the error will disappear and normal operation will resume Contact your dealer if this error occurs frequently
G031-H	Hard	There was an overpower on the output of the PowerRouter	<ul style="list-style-type: none"> Turn off the loads connected to the PowerRouter Restart the system (section 7.5.1)
G034-H	Hard	See P092-H	
G036-H	Hard	See P098-H	

G039-S	Soft	The output power of the grid module (G) has been reduced because the grid frequency was too high	<ul style="list-style-type: none"> The error will disappear and normal operation will resume when the grid frequency is within approved limits
G040-S	Soft	The output power of the grid module (G) has been reduced because the grid voltage was too high	<ul style="list-style-type: none"> The error will disappear and normal operation will resume when the grid voltage is within approved limits
G041-S	Soft	The output power of the grid module (G) has been reduced because the 10 minute average of the grid voltage was too high	<ul style="list-style-type: none"> The error will disappear and normal operation will resume when the 10 minute average of the grid voltage is within approved limits
B004-S	Soft	The temperature sensor on the batteries indicates the temperature of the batteries is too high	<ul style="list-style-type: none"> Check the ambient temperature of the room where the batteries are located. The ambient temperature of the room in which the PowerRouter is located must not exceed 40 degrees Celsius. The error will be cleared when the temperature decreases
B007-S B008-S B009-S B014-S B015-S B016-S B017-S B018-S B019-S B030-S	Soft	<p>The internal temperature of the battery module (B) is too high</p> <p>The output power of the module has been reduced</p>	<ul style="list-style-type: none"> Check the PowerRouter airflow (section 7.5.2) When the module cools down the error will disappear and normal operation will resume Contact your dealer if this error occurs frequently
B010-H B012-H	Hard	The voltage level of an internal battery module (B) circuit was out of bounds	<ul style="list-style-type: none"> Check the following: <ul style="list-style-type: none"> the battery capacity settings (with the install tool or the wizard on the display) the quality of the batteries Make sure the loads on the local out are turned off Restart the system (section 7.5.1)
B011-H B013-H B021-H	Hard	An overcurrent was detected in one of the internal circuits of the battery module (B)	<ul style="list-style-type: none"> Make sure the loads on the local out are turned off Restart the system (section 7.5.1)
B020-S	Soft	An overvoltage occurred on the power backbone. The grid module (G) will be temporarily turned off	<ul style="list-style-type: none"> When the voltage drops below the safe level the error will disappear and normal operation will resume Contact your dealer if this error occurs frequently
B024-H	Hard	The battery module (B) detected a short on the module input	<ul style="list-style-type: none"> Check the wiring of the battery to the PowerRouter Restart the system (section 7.5.1)
B026-H	Hard	See P092-H	
B028-H	Hard	See P098-H	
B038-S	Soft	There was an internal communication error within the PowerRouter	<ul style="list-style-type: none"> After one minute the error will disappear and normal operation will resume Contact your dealer if this error occurs frequently
B055-H	Hard	The battery module (B) detected an overvoltage on the module input	<ul style="list-style-type: none"> Check the wiring of the battery to the PowerRouter Restart the system (section 7.5.1)

S002-S	Soft	The internal temperature of the solar module (S) is too high	<ul style="list-style-type: none"> • Check the airflow of the PowerRouter (section 7.5.2) • When the module cools down the error will disappear and the normal operation will resume • Contact your dealer if this error occurs frequently
S023-S		The output power of the module has been reduced	
S004-S	Soft	The solar string voltage connected to one or both of the inputs exceeds 600 volts	<ul style="list-style-type: none"> • Check the solar panel configuration and wiring • The error will disappear when the voltage on both strings drops below 600 volts
S005-S	Soft	An overvoltage occurred on an internal bus of the solar module (S)	<ul style="list-style-type: none"> • The error will disappear when the voltage drops below the limit • Contact your dealer if this error occurs frequently
S007-S	Soft	An overcurrent occurred on an internal circuit of the solar module (S)	<ul style="list-style-type: none"> • After ten minutes the error will disappear and normal operation will resume • Contact your dealer if this error occurs frequently
S013-S	Soft	The output power of the solar panels exceeds 6000 watts	<ul style="list-style-type: none"> • This error will disappear when the power drops below 6000 watts • Contact your dealer if this error occurs frequently
S016-S	Soft	There was an internal communication error within the PowerRouter	<ul style="list-style-type: none"> • The error will disappear automatically and normal operation will resume • Contact your dealer if this error occurs frequently
S019-H	Hard	See P092-H	
S021-H	Hard	See P098-H	



Check www.PowerRouter.com for the latest version of the errorlist.

7.7 Check the internet connection

The display will show information about the internet status like: Internet connection status (ok, error, counting), Last date and time when the PowerRouter was connected to the internet, the IP number and status of the firmware distribution.

7.8 Look up the software versions and id number

Open the service menu and navigate to revision. Here you will find:

- The firmware versions of the various internal modules.
- The PowerRouter's unique identification number here.

7.9 Reset the PowerRouter

If the PowerRouter is not working as expected, it may help to perform a restart.



CAUTION

Notify the end-user before you do a restart. A restart of the PowerRouter can result in a temporary power failure. This means that no power will be available for the end-user. The restart takes less than 1 minute.

1. Notify the end-users that there may be a brief power interruption.
2. Open the service menu.
3. Navigate to the restart procedure.
4. Activate the restart procedure.

7.10 Self test (for Italy)



The self test is required safety check for Italy.

The self test simulates grid voltage and frequencies. The PowerRouter must respond safely to these simulated abnormalities. If the PowerRouter is within the Italian specifications, the self test is OK. If the self test fails, the PowerRouter will switch off.

1. Open the service menu, and navigate to the option 'Self test'.
2. Start the 'Self test' and wait until it is finished.



If the PowerRouter switches off during the test. Restart the PowerRouter and redo the test. If the 'Self test' fails the second time, contact your local supplier.

8 De-installation



DANGER

To safely de-install the PowerRouter, you must follow the instructions in this chapter.

8.1 De-install

To de-install the PowerRouter:

1. Switch the PowerRouter unit OFF.
2. Switch the DC switches OFF.
3. Switch the AC switches OFF.
4. Wait at least 5 minutes, to ensure the unit is completely de-energised.
5. Disconnect the communication wires.
6. Disconnect any optional connections.
7. Disconnect the solar panel string wiring with the special tool (figure 9).
8. Disconnect the AC wires.
9. Disconnect the DC wires.
10. The PowerRouter can now be removed for disposal or repair.



DANGER

The wires from the solar panels are always energised. The voltage from a string of solar panels can be as high as 600 V. The current can be as high as 15 A.



CAUTION

De-installation must be carried out by qualified personnel. Contact your installer/dealer.

8.2 Disposal

When the PowerRouter reached the end of its service life, or is defect beyond repair:

- Dispose of the PowerRouter according to local regulations.
- Submit the PowerRouter to a collection point for electrical and electronic waste recycling.



CAUTION

The PowerRouter must not be disposed of with household waste.

9 Technical specifications

9.1 Technical specifications of the PowerRouter

AC output	PR50SB-BS	PR37SB-BS	PR30SB-BS
Continuous output power at 40°C (P nom)	5000 W (DE: 4600 W)	3700 W	3000 W
AC output current	25 A (DE: 22A)	16 A	13 A
Cos Phi	1 (DE: 0.9 ind. ... 0.9 cap. adjustable)		
Nominal output voltage	230 Vac, 50 Hz		
AC output range	180-264 Vac 45-55 Hz (limited by local anti-islanding regulations)		
AC output voltage (local out)	230 Vac \pm 2%, 50 Hz \pm 0.2%, true sine wave <3% THD, single phase		
Peak power (local out)	2 x Pnom., 10 sec.		
Protection	electronic, fused		
Standby losses	< 11W		
User interface	display with 4-button operation		
Connectivity	ethernet (RJ45), TCP/IP		
User-selectable relays	2 provided. NO/NC, 250Vac, 1 A, 24 Vdc, 5 A		

Solar panels	PR50SB-BS	PR37SB-BS	PR30SB-BS
Max. input	5.5 kWp and 15 A per string	4 kWp and 15 A per string	3.3 kWp and 15 A
No. of inputs	2	2	1
No. of MPP trackers	2, fully independent	2, fully independent	1
DC disconnect switch	4-pole, 600 V, 15 A	4-pole, 600 V, 15 A	2-pole, 600 V, 15 A
Solar voltage	100-600 Vdc per string		
MPP voltage	180-480 Vdc per string		
Solar connections	MC4		
Max. efficiency	94% (93% EU)		
Max. MPP efficiency	99.9%		

Lead-acid (wet/gel) and AGM	PR50SB-BS	PR37SB-BS	PR30SB-BS
Battery voltage range (Vout)	21 - 31 Vdc		
Charge current	25 - 200 A continuous, programmable	25 - 155 A continuous, programmable	25 - 125 A continuous, programmable
Battery capacity	min. 100 Ah, at 25A charge current		
Charging curve	3-stage adaptive with maintenance		
Short circuit protection	electronic, at max. charge current, switch off <1 sec		
Battery temperature compensation	included		
Battery voltage sense	integrated		
Current shunt	integrated		

Environmental	PR50SB-BS	PR37SB-BS	PR30SB-BS
Operating temperature range (full power)	-10 °C to +50 °C (derating above 40 °C)		
Storage temperature	-40 °C to +70 °C		
Humidity	maximum 95%, non-condensing		
Regulatory approvals and standards	CE, VDE-AR-N 4105:2011-08, EEG2012, C-Tick		
Safety	EN 60950-1, EN 62109-1, EN 60335-2-29		
Emission	EN 55014-1, EN 61000-3-2, EN 61000-3-3, EN 61000-6-3		
Immunity	EN 55014-2, EN 61000-6-2		
Anti-islanding protection	VDE 4105, VDE 0126.1.1, G83/1(UK), RD1663/2000(ESP), DK5940 E.d. 2.2, CEI0-21 pending (IT), AS4777(AUS) (check www.PowerRouter.com for other country certifications)		
Warranty	five years (optional: extension to ten years)		

General	PR50SB-BS	PR37SB-BS	PR30SB-BS
Dimensions (W x H x D)	765 x 502 x 149 mm		
Protection category	indoor use (IP20)		
Weight	20.5 kg		
Topology	galvanically isolated transformer		
Cooling	forced airflow		

9.2 Example of possible battery types

The PowerRouter functions with any lead-acid batteries. Below you find an example of some possible batteries.

Energys PowerSafe SBS

Battery type	Number of batteries	Battery pack size (C10 Ah)	Maximum charge current	Bulk voltage	Float voltage
SBS 190F	2	190 Ah	47 A	28,8 V	27,5 V
	4*	380 Ah	95 A		
* two batteries in serie, and two paralel string					

HOPPECKE OPzV bloc Solar.power

Battery type	Number of batteries	Battery pack size (C10 Ah)	Maximum charge current	Bulk voltage	Float voltage
6V 4 OPzV 250	4	205 Ah	41 A	28,8 V	27,0 V
6V 5 OPzV 300	4	250 Ah	50 A		
6V 6 OPzV 370	4	308 Ah	61 A		

BAE Secura PVV BLOCK Solar

Battery type	Number of batteries	Battery pack size (C10 Ah)	Maximum charge current	Bulk voltage	Float voltage
6V 4 PVV 280	4	229 Ah	45 A	28,2 V	27,0 V
6V 5 PVV 350	4	286 Ah	57 A		
6V 6 PVV 420	4	344 Ah	68 A		

the PowerRouter

